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REICHHOLD CHEMICALS, INC. - PARCEL A
TACOMA, WASHINGTON

UPDATED RESOURCE CONSERVATION AND RECOVERY ACT FACILITY ASSESSMENT

DRAFT REPORT

Prepared for

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Enforcement and Compliance Assurance
Washington, D.C. 20460

Work Assignment No.	:	R10031
EPA Region	:	10
EPA ID. No.	:	WAD 009252891
Date Prepared	:	August 27, 1997
Contract No.	:	068-W4-0004
Prepared by	:	Tetra Tech EM Inc.
Tetra Tech Project Manager	:	David Zimmermann
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EPA Work Assignment Manager	:	Robbie Hedeen
Telephone No.	:	206/553-2586

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ACRONYMS AND ABBREVIATIONS

AOC	Area of concern
AST	Aboveground storage tank
bgs	Below ground surface
CFR	Code of Federal Regulations
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
HSWA	Hazardous and Solid Waste Amendments
mg/kg	Milligrams per kilogram
μg/L	Micrograms per liter
OBPCP	Orthobenzylparachlorophenol
PAH	Polycyclic aromatic hydrocarbons
ppb	Parts per billion
PCB	Polychlorinated biphenyl
PCP	Pentachlorophenol
ppm	Parts per million
PVA	Polyvinyl acetate
RCI	Reichhold Chemicals, Inc.
RCRA	Resource Conservation and Recovery Act
REPA	RCRA Enforcement, Permitting, and Assistance
RFA	RCRA facility assessment
SWMU	Solid waste management unit
TFP	Treated fiber products

1.0 INTRODUCTION

Tetra Tech EM Inc. (Tetra Tech) received work assignment R10031 from the U.S. Environmental Protection Agency (EPA) under contract 68-W4-0004, Resource Conservation and Recovery Act (RCRA) Enforcement, Permitting, and Assistance (REPA). This work assignment consists of conducting an updated RCRA Facility Assessment (RFA) at "Parcel A" of the Reichhold Chemicals, Inc. (RCI) facility in Tacoma, Washington. The original RFA, hand-dated July 15, 1987, covered the entire facility and was used as the basis for this report. The author of the original RFA was not provided.

The work assignment includes conducting a file review to examine the status of RCRA Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) identified by the original RFA for Parcel A and reporting on the cleanup activities conducted to date. A visual site inspection of the facility was not conducted, and facility personnel were not interviewed.

1.1 METHODOLOGY

RCRA sections 3004(u), 3004(v), and 3008(h), implemented under the 1984 Hazardous and Solid Waste Amendments (HSWA) to RCRA, give EPA broad authority to assist in the detection and correction of problems from past and current waste management practices at RCRA facilities. The RFA, which is the first stage of the RCRA corrective action program, focuses on the identification of SWMUs and AOCs. A SWMU is defined as follows in the proposed applicable part of the corrective action regulations in Title 40 of the Code of Federal Regulations (CFR) 264 Subpart S (Federal Register, Vol. 55, No. 145, July 3, 1990):

> Any discernible unit at which solid wastes have ben placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste. Such unit include any area at the facility at which solid wastes have been routinely and systematically released.

The main objectives of the RFA at RCI are as follows:

- Identify all SWMUs that pose no concern or threat to human health or to the environment.
- Identify all SWMUs and AOCs that pose a potential concern or threat to human health or to the environment.

- Gather evidence of release or releases sufficient to compel the owner/operator to conduct additional remedial investigations.
- Prioritize SWMUs and AOCs for further investigation.
- Identify the scope of subsequent potential remedial investigations or any immediate stabilization or corrective action measures; and complete the corrective action stabilization checklist /questionnaire.

1.2 PROCEDURES

This RFA report was prepared in accordance with EPA's RFA guidance document (EPA 1986). As part of the review, Tetra Tech identified, collected, and reviewed documents and regulatory files dating from 1984 to the present. Available facility information and analytical data in the EPA Region 10 office were inspected. This RFA report summarizes the file review findings for Parcel A.

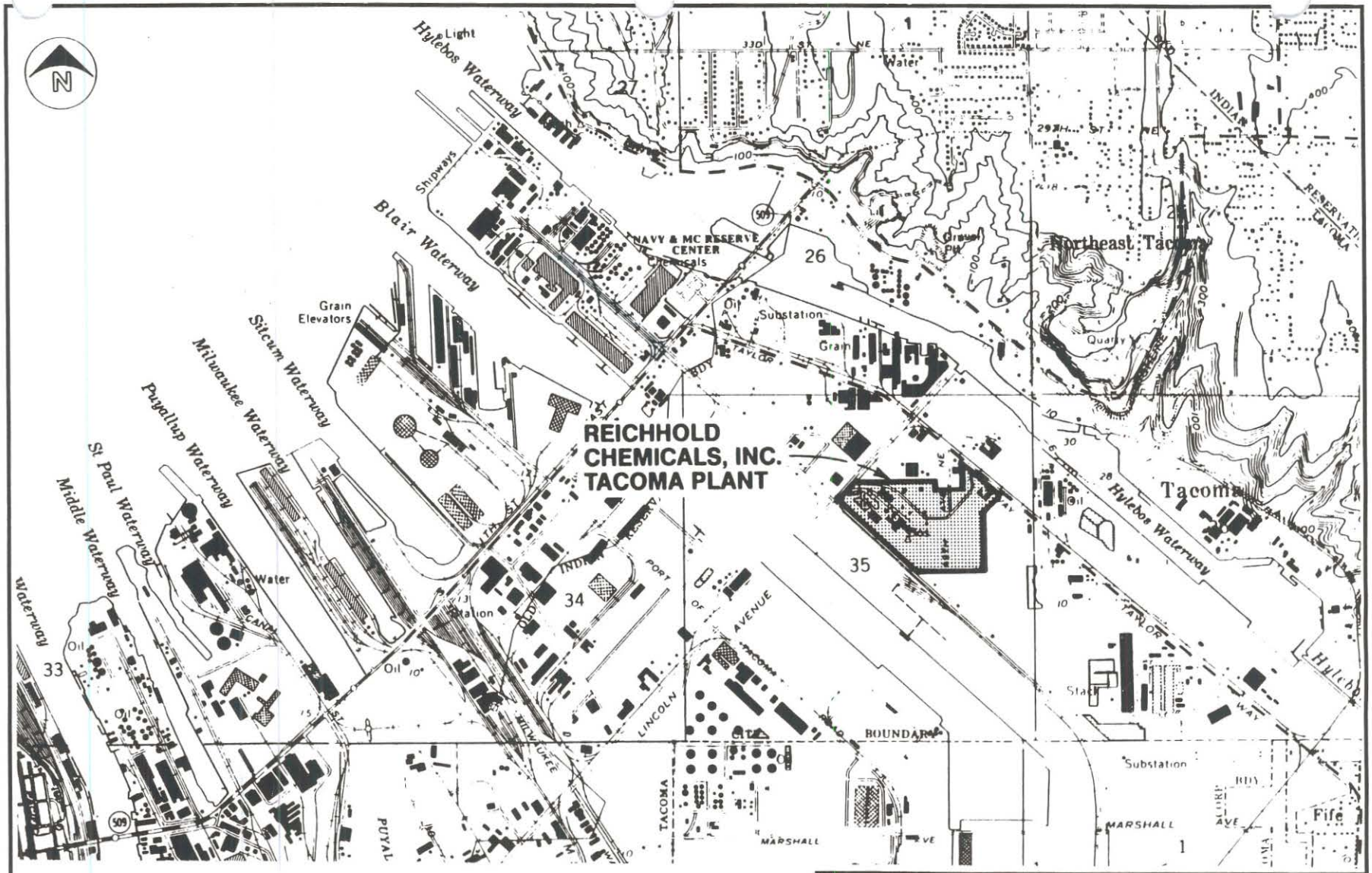
Section 2 briefly summarizes the facility's location and operations, regulatory history, and site geology and hydrogeology. Section 3 summarizes RCRA-identified SWMUs, AOCs, and cleanup activities conducted at Parcel A. Section 4 provides conclusions.

2.0 FACILITY DESCRIPTION AND BACKGROUND

This section summarizes the facility's location and operations, its regulatory history, the site geology and hydrogeology, and previous site characterization efforts at Parcel A.

2.1 SITE LOCATION AND DESCRIPTION

RCI owns a former manufacturing facility on approximately 52 acres of land between Taylor, Lincoln, and Alexander Ways in the Commencement Bay industrial area, Tacoma, Washington. The site is located at 2340 Taylor Way, Tacoma, Pierce County, Washington, at latitude 47° 15′ 59.6″ North and longitude 122° 23′ 00.2″ West. The site location is depicted in Figure 2-1.



Source: USGS, 1981

REICHHOLD CHEMICALS, INC.
TACOMA, WASHINGTON

FIGURE 2-1
SITE LOCATION

Tetra Tech EM, Inc.

The site is located between the Blair and Hylebos Waterways on an artificial peninsula created in the early 1950s by using dredge spoils from adjacent waterways to fill the then-existing salt marsh. Since the early 1900s, hazardous substances and waste materials from numerous industrial and commercial businesses have been released into the surrounding terrestrial and marine environments. These discharges have altered the chemical nature of the sediments used to develop the tideflats area. The contaminants include metals, organic compounds, and polycyclic aromatic hydrocarbons (PAH) (CH2M Hill, 1988b).

The area is typified by large-scale industrial development, including a Pennwalt Chemical chlorine facility, a Kaiser Aluminum Plant, and Weyerhaeuser wood chip processing operations and cargo loading docks operated by the Port of Tacoma (PRC EMI 1990).

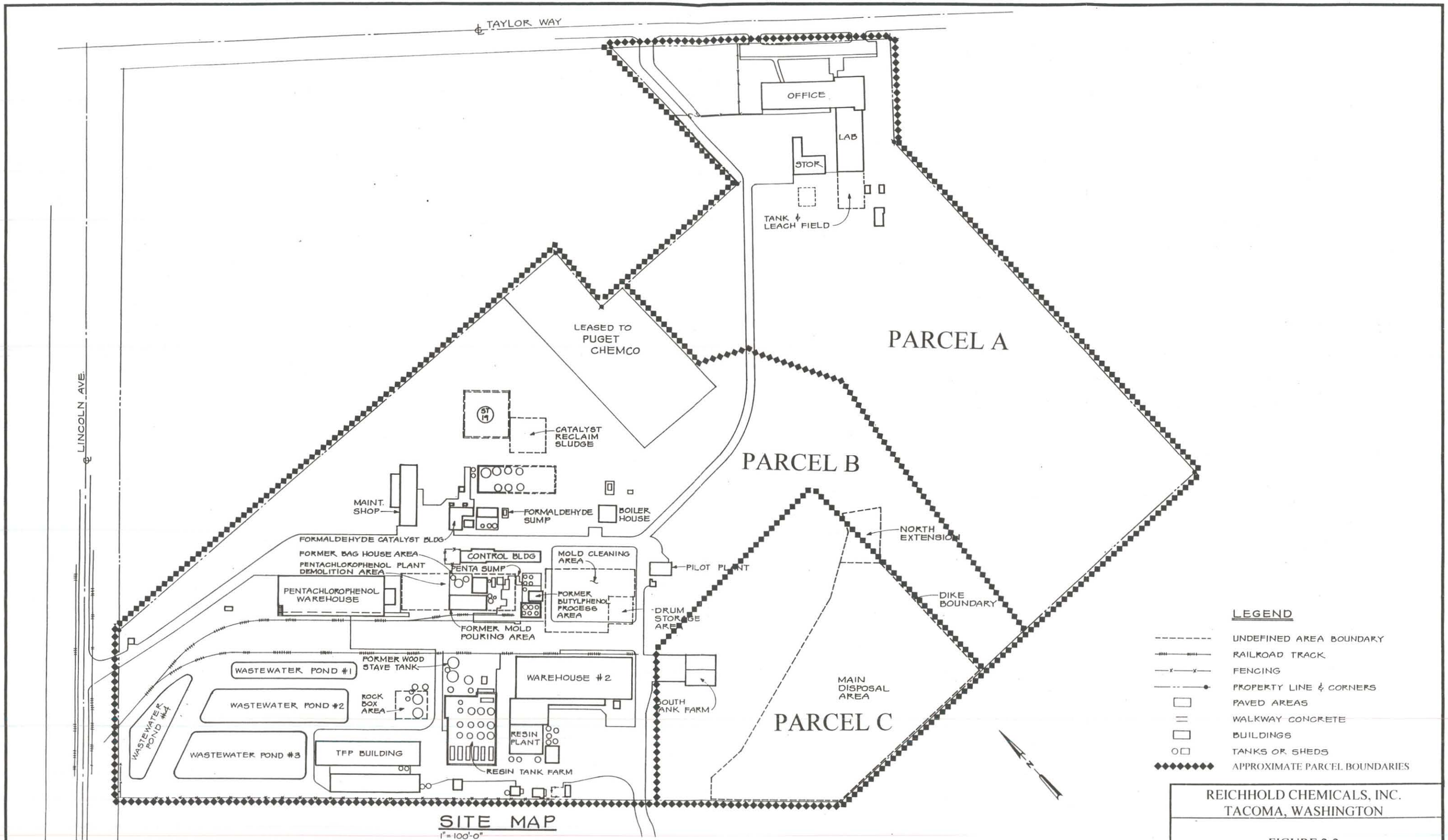
The site has a flat terrain with generally less than 5 feet of topographic relief. The site is approximately 800 feet north of the Blair waterway and 1,000 feet south of the Hylebos waterway. Stormwater runoff from the site used to flow into the Blair waterway, but now is routed through the City of Tacoma Treatment Plant.

Parcel A is the northeastern area of the RCI facility which includes the former Reichhold offices and laboratory. The approximate boundaries of Parcel A are shown in Figure 2-2 and the legal property description is provided as an attachment.

2.2 OPERATIONS AND WASTE MANAGEMENT

RCI manufactured a variety of chemical products including pentachlorophenol from 1956 to 1985. In 1985, RCI ceased production of pentachlorophenol and dismantled the production area. Presently, the site is not used for product manufacturing. RCI's activities at the site are limited to hazardous waste remediation. Table 2-1 lists products manufactured at the Reichhold facility, chemicals involved in the manufacturing process, and the waste products generated.

This report will focus on structures and features located within Parcel A with a list and brief description of all features in the Reichhold facility. Operations and waste management practices in Parcel A are described in Section 2.2.1, operations and waste management practices in Parcels B and C are briefly described in Section 2.2.2.



SITE MAP
1" = 100'-0"

REICHHOLD CHEMICALS, INC.
TACOMA, WASHINGTON

FIGURE 2-2
PARCELS A, B, AND C

Tetra Tech EM, Inc.

Source: modified from CH2M Hill, 1986

TABLE 2-1

CHEMICALS PRODUCED AND WASTES GENERATED
REICHHOLD CHEMICALS, INC.
(Page 1 of 2)

Product	Manufacturing Dates	Chemicals Involved in Production	Waste Products Generated from Process
Calcium chloride	1956 to Feb. 1985	unknown	
Ferrous molybdenite (Formox catalyst)	1959 to Mar. 1986	Ammonia, paraformaldehyde, and ammonium molybdate	Molybdenum hydroxide
Formaldehyde	1957 to Apr. 1985	Methanol and oxygen	Sodium formate, iron, and waste from cleaning
Hydrochloric acid	1956 to Feb. 1985	unknown	
Orthobenzylparachlorophenol (OBPCP)	1966 to 1975	Parachlorophenol, benzyl chloride, boric chloride, phenol, chlorine, isopropyl alcohol, and monochlorophenols	Polymerized process ingredients, hydrochloric acid, calcium chloride sludge, spent limestone, and waste from cleaning
Pentachlorophenol (PCP) Tetrachlorophenol Sodium pentachlorophenate	1956 to Feb. 1985	Phenol, chlorine, aluminum chloride, diphenyl sulfide, lactic acid, pentachlorophenate, and sodium hydroxide (sodium)	Calcium chloride sludge with some phenol, spent carbon with phenol, spent limestone with calcium chloride and phenol, hydrochloric acid, and waste from cleaning
Urea formaldehyde and Phenol formaldehyde resins	1959 to Dec. 1985	Phenol, urea, sodium hydroxide (sodium), formic acid, triethanol amine, ethyl alcohol, and resourcinol	Phenols, formaldehyde, methanol, sodium hydroxide, intermediate products, and waste from cleaning
Polyester resin	1961 to Dec. 1985	Propylene glycol, phthalic anhydride, maleic anhydride, styrene monomer, hydroquinone, parabenzoquinone, mon-ter-buhydroquin, t-butyl catachol, methanol, ethylene glycol, cobalt octoate, and dimethyl analine	Esters of process ingredients, phthalic anhydride, maleic anhydride, and waste from cleaning

TABLE 2-1 (Continued)

CHEMICALS PRODUCED AND WASTES GENERATED
REICHHOLD CHEMICALS, INC.
(Page 2 of 2)

Product	Manufacturing Dates	Chemicals Involved in Production	Waste Products Generated from Process
Polyurethane	1969 to Mar. 1985	Poly glycol, freon, lead napthalate (lead), silicon surfactant, Dicyclopentadienyl iron (iron), aromatic amine, and triethylamine	Waste from cleaning
Polyvinyl acetate (PVA)	1961 to late 1984	Vinyl acetate, polyvinyl alcohol, sodium persulfate, and microbicide	Intermediate products and sodium hydroxide (sodium)
Protein adhesive	1956 to 1984	Soybean and wood flour, animal blood, sodium terraborate (sodium), and diesel oil	Not known
Tertiary butyl phenol	1975 to 1983	Phenol isobutylene, flaked potash (potassium), trifluoromethene sulfonic acid, and stabilizer	Intermediate phenol butylene products waste from cleaning
Treated fiber products (TFP)	1961 to unknown	Paper, various resins, methyl ethyl ketone, and acetone	Waste from cleaning

Source: EPA 1987

2.2.1 Parcel A

The main offices and laboratory are located in the northern portion of Parcel A, located on the eastern edge of the RCI property. The area is approximately 15 acres in size. Technical service and bench-scale product development took place in the lab section of the main office building. Small quantities of waste were generated in the laboratory, and many were handled as laboratory packs. Analytical data indicate waste was generated within this complex and discharged to an onsite septic tank and leach field located to the south (CH2M Hill 1989a). The amount of wastes disposed of in this manner is unknown.

The southern portion of Parcel A encompasses an area referred to as the nonprocess area. Based on evaluation of aerial photographs and the examination of facility records, the area consists of vegetated land and cleared areas overlying dredge spoils used as fill at RCI. The area was not thought to have been used by past RCI operational practices and was considered representative of local background conditions. However, aerial photographs shows tire tracks and ruts indicating some sort of vehicle activity in the area. A 1964 aerial photograph showed four shallow trenches at the southern edge of the nonprocess area which were investigated in 1989. The results of this investigation are provided in Section 2.6

2.2.2 Parcels B and C

The majority of RCI manufacturing and waste disposal activities occurred in Parcels B and C. This section presents a brief description of the main process areas. The areas are shown in Figure 2-2.

Pilot building. This building was used to produce small batches (1-8 drums) of experimental urea-formaldehyde resin, phenol-formaldehyde resin, polyvinyl acetate resin, and blends from experimental polyester resins. A small research maleic anhydride pilot plant was also located near the pilot building. Drum quantities of acetone, methyl ethyl ketone, mineral spirits, and other solvents and thinners were stored and used in this area. A pilot wood treating system used for product development in wood preservatives was also located near the pilot building.

Boiler plant. A separate facility composed of two operational boilers and a fuel tank farm. These boilers supplied high pressure steam and utility heat to the plants. Steam condensate from all areas was returned to the boiler or lost to the treatment system. Boilers were blown down to the process waste water sump in

the formaldehyde area. A diked tank farm adjacent to the boiler house was used for fuel storage. Diesel was the only liquid fuel used on site, and was only used when there were restrictions on natural gas.

Treated fiber products (TFP) area. A variety of paper products were produced in this area for use in the building trade, manufacturing furniture, paneling, and for decorative inlays. To produce the products, heavy paper was treated with resins. The principal equipment used were specialized machines for the continuous saturation, drying, bonding, and custom cutting of the papers. Methyl ethyl ketone and acetone were the major solvents. Wastes were generated from cleaning equipment. Protein adhesive was produced in the dispersal building which is also located in the treated fiber products areas. The waste products from protein adhesive productions were soya flour and congealed blood.

Resin process area. This area included the process vessels for manufacturing a variety of synthetic resins and the storage tanks (resin tank farm). The major resins produced were urea-formaldehyde, phenol-formaldehyde, polyvinyl acetate, polyester, and polyurethane foam. These operations were batch operations. The waste and clean out products were phenols, formaldehyde, methanol, sodium hydroxide, esters of process ingredients, and spills of process ingredients.

Chemical process area. This area included manufacturing facilities for 50% formaldehyde solution, formaldehyde catalyst, pentachlorophenol, tetrachlorophenol, p-tert butyl phenol, 35% calcium chloride brine, ferrous molybdenate, molybdenate trioxide, OBPCP, and sodium pentachlorophenate.

- The formaldehyde plant consisted of three continuous process units for the conversion of methanol to formaldehyde. Most of the formaldehyde was used in resins. The formaldehyde catalyst plant was a batch operation using molybdenum trioxide, ammonium hydroxide and ferric chloride as the major raw materials. The waste stream and clean out products from these processes were sodium formate, iron, molybdenum hydroxides, and paraformaldehyde.

- The pentachlorophenol (PCP or penta) process consisted of three batch units for manufacturing PCP from phenol and chlorine. By-product hydrochloric acid (20% Baume) was primarily used for production of calcium chloride. The waste and clean out products from these processes were calcium chloride sludge with some phenol, spent carbon with phenol, and spent limestone with calcium chloride and phenols. Tetrachlorophenol was also produced using the same process as pentachlorophenol.

- Sodium pentachlorophenate was produced from pentachlorophenol and sodium hydroxide in the penta plant. The waste produced was polymerized chlorinated sludge.

- Molybdenum trioxide and ferrous molybdenate were manufactured on-site. Molybdenum hydroxide was a waste product from this process.

- The tertiary butyl phenol plant manufactured product from isobutylene and phenol and consists of one batch reactor and distillation equipment. The wastes produced were intermediate phenol butylene products.

- OBPCP was produced from monochlorophenols, benzyl chloride, phenol, boric chlorine, and isopropyl alcohol. The waste products were polymerized process ingredients, hydrochloric acid, calcium chloride sludge, and spent limestone.

Wastes from these areas were either disposed of through the process wastewater system, drummed for disposal at a hazardous waste facility, disposed of through the Tacoma Refuse system, or disposed of in the main disposal area.

2.3 REGULATORY HISTORY

The following sections summarize RCI's regulatory history leading up to the issuance of its permit to operate as a hazardous waste storage facility and describe corrective actions conducted at Parcel A as specified by the permit. A complete record of all pre-permit related documents can be found in the EPA administrative record for the site.

2.3.1 General History Prior to RCRA Permit Issuance

August 13, 1980	RCI submits a Notification of Hazardous Waste Activity for the Tacoma facility to EPA.
November 17, 1980	RCI submits a Part A permit application.
September 13, 1982	RCI submits a revised Part A permit application.
April 15, 1985	RCI submits a subsequent Notification of Hazardous Waste Activity indicating that generation was the only hazardous waste activity conducted at the facility.
May 21, 1985	Washington State Department of Ecology (Ecology) conducts a compliance inspection of the facility.

July 31, 1985	EPA and Ecology inspect the facility. Marsh area used for the disposal of sludge from the wastewater treatment lagoons designated as a dangerous waste landfill. Disposal of sludge from the lagoons to the marsh area ceased.
August 12, 1985	Ecology assesses a $9,000 penalty against Reichhold for the discharge of phenols into public waters.
November 22, 1985	RCI submits a closure and post-closure plan to EPA and Ecology that outlined pre-closure site investigations, including an evaluation of closure alternatives. RCI submits documents for facility closure and post-closure and documents demonstrating responsibility for financial liability to EPA and Ecology.
December 12, 1985	RCI submits revised documents to EPA and Ecology in response to EPA and Ecology's comments on the November 22, 1985 documents.
February 7, 1986	RCI submits original Part B permit application, including a revised Part A permit application.
January 31, July 21, and October 8, 1986	RCI revises and resubmits the Part A permit application.
June 30, 1986	A consent agreement between RCI and Ecology accompanied by the assessment of a civil penalty of $35,000 against RCI for: (1) non-permitted disposal of a hazardous waste on the 4-acre disposal site and in Ponds, 1-4; (2) operating without an adequate groundwater monitoring system; (3) the lack of liability insurance; (4) no financial assurance (bond) to pay for closure and post-closure activities; and (5) having no closure or post-closure plan.
January 1988	An additional Part A permit application and revised Part B permit application is submitted to EPA.
November 1988	RCRA Compliance Evaluation Inspection, Final Report submitted to EPA. Report prepared by Jacobs Engineering Group, Inc.
November 4, 1988	RCRA permit issued to RCI by EPA.

2.3.2 Corrective Measures Taken In Parcel A

The RCRA permit mandated several corrective action measures. The focus of this RFA Update is Parcel A. Therefore, the remainder of this section will list corrective measures taken in Parcel A only.

1989 Soil sampling in the septic tank area (SWMU 12) and area 50. Results of sampling indicated no contamination in area 50 above cleanup levels specified in the Draft RCRA Facility Investigation Guidance Document. Therefore, no further corrective measures were required for area 50. The septic tank area was found to have PCB Aroclor 1248 contamination above cleanup levels (CH2M Hill 1989a). Plans were made for the excavation of the contaminated soil in and around the septic tank area (SWMU 12).

1990 Excavation of contaminated soil in the septic tank area (SWMU 12). Excavated soils were transported to two waste pile cells located outside of Parcel A in the main disposal area of the RCI facility. Confirmation soil samples were taken to ensure removal of contaminants. After soil sample analysis indicated no contamination above cleanup levels, the excavation was backfilled with clean, compacted fill (CH2M Hill 1991).

2.4 GEOLOGY AND HYDROGEOLOGY

Information about the site's geology and hydrogeology was obtained from several assessment reports including the Preclosure Investigation and Hydrogeologic Report, the Groundwater Assessment Report (CH2M Hill, 1987), and the Operation and Maintenance Inspection Report (PRC EMI 1990). This section provides information on site geology and groundwater hydraulics. The site geology provides a lithologic description of the units present at the site. Hydrogeologic names such as uppermost aquifer, are used to establish the relationship between geologic and hydrogeologic units. Hydrogeologic descriptions of aquifer characteristics are provided in Section 2.4.2 Groundwater Hydraulics.

2.4.1 Site Geology

Geological data for the RCI site has been gathered during the monitoring well installation program by CH2M Hill. Near-surface alluvial sediments of the Puyallup River delta consist of interbedded sequences of sand, silt, clay, and peat. There are five major units beneath the surface; three aquifers with two intervening aquitards. Geologic cross-sections produced for a 1988 drilling summary (CH2M Hill 1988b) indicate that the units of interest are continuous across the site.

The uppermost unit is identified as the shallow aquifer and consists primarily of original tidal marsh sediments that have been modified by dredge and fill activity. This material typically includes fine to medium graded brown to grey sand and silty sand. Borehole logs also indicate occasional coarse sand, organic fibers, and fill material.

The aquitard beneath the uppermost aquifer consists primarily of silt, clayey silt, and organic silts. The aquitard reportedly has zones of peat and shell fragments interbedded with silt, sandy silt and very fine to fine sand. It ranges from moderately plastic to dry and friable, with organic fibers and wood fragments. The aquitard is thinnest under the process area of the facility on the east side of the plant and along the northern property line (Parcel B).

The intermediate aquifer, similar to the shallow aquifer, is composed coarse, medium, fine sand, and silty sand. Borehole logs indicate that the intermediate aquifer is predominately silty on the east side of the site and sandier to the west (Parcel A).

The lower aquitard lies between the intermediate aquifer and the deep aquifer. The areal extent of the lower aquitard is unknown because several wells terminate just above the upper surface of this unit. The lower aquitard is typically a gray-brown silt with varying ranges of plasticity and zones of clayey silt. Borehole logs indicate that this unit is sandier at the south and western margins of the site (CH2M Hill 1988b).

The deep aquifer consists of fine, medium, and coarse sands with occasional interbedded silts. The deep aquifer is present in the center of the site and along the southwestern border of the site.

2.4.2 Groundwater Hydraulics

Groundwater in the uppermost (shallow) aquifer is under water table (unconfined) conditions and is recharged via surface infiltration. Groundwater flow is from the center of the peninsula towards the Blair and Hylebos waterways on either side. The shallow aquifer is not affected by ocean tides (CH2M Hill 1987).

Potentiometric surface mapping indicates a groundwater divide on the east side of the site in the shallow aquifer. The divide is also present in the intermediate aquifer. There is not enough data to indicate whether the divide exists in the deep aquifer. The divide is significant in the shallow and intermediate aquifers because it affects groundwater flow direction.

The intermediate aquifer is a confined aquifer, subject to minute fluctuations in flow direction due to regional tidal effects. The predominant groundwater flow direction, however, is towards the northwest, away from the north-south trending groundwater divide on the eastern side of the RCI site.

The deep aquifer is also a confined aquifer system. Water levels indicate an average seasonal variation of approximately 3 feet. The general groundwater flow direction in the deep aquifer is north towards Commencement Bay. This aquifer, however, shows a significant response to tidal fluctuations. In the western half of the site, deep aquifer groundwater reverses flow direction in response to tidal influence (CH2M Hill 1987).

Groundwater level data from 1987 indicated downward vertical gradients in both the shallow and intermediate aquifers. An upward gradient was observed locally in the deep aquifer. All of the aquifers discharge to Commencement Bay.

2.5 CLIMATE

According to RCI's Part B permit application, the Tacoma area has a normal annual temperature of approximately 51°F. The warmest months of the year are typically July and August, the coolest months are usually December, January, and February. It is expected that the daily maximum temperature will exceed 90°F approximately five days per year with 100°F being the highest temperature. The minimum temperature will fall below freezing approximately 31 days a year with the lowest temperature being approximately 0°F.

The normal annual precipitation is approximately 39 inches per year. Precipitation in the amount of 0.01 inch or more can be expected 160 days per year, snowfall of 1 inch or more occurs 5 days per year, thunderstorms occur on an average of 7 days per year, and heavy fog (visibility of less than ¼ mile) is expected about 50 days per year. The months of November, December, and January receive the highest amounts of precipitation, usually about 6 inches per month. The month with the lowest amount of precipitation are May, June, July, August, and September, with July having the lowest monthly average of 0.75 inch.

The prevailing storm winds in the vicinity of the plant are primarily from the southwest. The annual mean windspeed is approximately 9 miles per hour, and the mean monthly windspeeds remain relatively constant throughout the year. Maximum windspeeds are approximately 45 miles per hour from the southwest, although the highest observed sustained (for longer than 1 minute) windspeed was in February 1958 when winds of 55 miles per hour came from the northwest.

2.6 SITE CONTAMINATION

This section describes general area-wide investigations that have been conducted at Parcel A. Results from corrective action sampling events conducted at specific SWMUs and AOCs are summarized in Section 3.

2.6.1 Nonprocess Area Soils Investigation

In January and February of 1988, surface and subsurface soil samples were collected from the nonprocess area. Two soil samples, (0 to 3 feet and 3 to 6 feet) were collected from 38 locations in the area. Samples from the odd numbered sample locations were submitted for laboratory analysis. Samples were analyzed for priority pollutant metals, cyanide, aluminum, magnesium, manganese, molybdenum, and vanadium. The objectives of this investigation were to:

- Investigate the nature and extent of inorganic constituents in nonprocess area soils
- Identify the possible sources of inorganic elements in nonprocess area soils and in shallow groundwater
- Evaluate whether these constituents might be attributed to Tacoma tideflats soil conditions rather than past operational practices at RCI

Arithmetic mean values for upper interval samples, lower interval samples, and the entire sample population are summarized in Table 2-2. The entire data set is reported in the nonprocess area soil report (CH2M Hill 1988b). Inorganics that were not reported at concentrations above the contracted detection limits include aluminum, antimony, beryllium, cadmium, cobalt, cyanide, mercury, selenium, and thallium. In addition to the means, Table 2-2 also presents the variability of the data set by the standard deviation and the expected distribution of individual inorganic concentrations around the respective mean values by

statistics (95 percent tolerance interval). The inorganic data from the nonprocess area were compared with:

- Inorganic data from the testing of groundwater underlying the site
- Other limited on-site and off-site soils inorganic analytical data
- Historical inorganic data from Commencement Bay sediments
- Ranges of naturally occurring levels of inorganic elements found in world soils
- Data produced from leach tests performed on RCI soils

The nonprocess area soils report concluded that the dredged sediments used to create the site were most probably the source of the inorganic elements found in the on-site soils. The inorganic elements or compounds used during the operational history of RCI were limited to aluminum, cobalt, lead, and molybdenum. Of these, only molybdenum was reported at anomalously high concentrations. The potential impacts of molybdenum were not evaluated because it has been removed from the list of contaminants regulated by EPA under the Safe Drinking Water Act. Finally, the report concluded that the inorganic elements detected in groundwater underlying the site originate from the natural leaching of onsite soil.

TABLE 2-2

SUMMARY OF NONPROCESS AREA SOILS DATA
REICHHOLD CHEMICALS, INC.
(mg/kg)

Parameter	Detected Range	Mean Concentration			Standard Deviation	95% Tolerance Interval
		NPA	UDI	LDI	NPA	NPA
Arsenic	2.5 - 12	4.76	4.48	5.02	2.5	ND - 9.7
Chromium	5 - 19	12.6	11.5	13.7	2.7	7.4 - 17.8
Copper	5 - 28	13.6	10.4	16.8	5.4	3 - 24.2
Lead	1.4 - 12.3	4.01	3.5	4.9	3.1	ND - 10.1
Magnesium	1,476 - 3,581	2,136.6	1,726.8	2,546.4	627.9	905 - 3,337
Manganese	48 - 102	64.9	55.5	74.3	15.8	33.8 - 96
Molybdenum	7.2 - 27.8	16.6	16.6	ND	7.4	2 - 31.2
Nickel	8 - 13	11.5	8	11.8	1.4	8.8 - 14.2
Silver[a]	2	2	0	2	NA	NA
Vanadium	21.3 - 56.4	40.2	37.6	42.8	7.0	26.5 - 53.9
Zinc	17 - 45	25.7	23.5	27.8	7.2	11.5 - 39.9

Notes:

a This element was detected only once
NPA Designates the mean of both upper and lower samples
UDI Upper depth interval sample
LDI Lower depth interval sample
ND Element not detected at the contracted detection limit
mg/kg Milligrams per kilogram
NA Not applicable

2.6.2 Off-site Drainage Ways

In March of 1988, sediment and surface water samples were collected from the surface drainages (ditches) that bound portions of the north, northwest, and southern boundaries of the RCI facility. The purpose of the study was to investigate the presence of inorganic and organic constituents in these drainage ways and to provide documentation that may be used, if necessary, to evaluate whether detected constituents are from RCI operations or other sources (CH2M Hill 1989b).

The ditches investigated in this study form two general drainage ways (north and south), which function independently. The ditches, which are all outside the RCI property except one, consist of narrow drainage segments locally connected or linked together through shallow, underground culverts. The ditches cut into the shallow aquifer materials adjacent to the site. They are generally vegetated and partially filled with sediments and surface waters. At the time of the investigation, both north and south drainage ways discharged to the Blair Waterway.

Field samples were collected from sediments at 39 individual locations. Three of the sampling locations in the northern drainage way were discreet and the remaining 36 were composited (three samples spaced 25 feet apart per composite sample) for a total of 12 composite samples. Discrete surface water samples were also collected at the center point of each of the sediment sampling locations, resulting in a total of 15 surface water samples. Sediment and surface water samples were analyzed for volatile organics, semivolatile organics, pesticides and PCBs, inorganics, and facility specific parameter not included in the routine analytical services list of parameters (CH2M Hill 1989b).

Surface water runoff from Parcel A enters the southern drainage way from which six sediment and six surface water samples were collected. Three sediment and three surface water samples were collected upgradient of Parcel A, and two surface water and sediment samples were collected downgradient of Parcel A. Samples collected adjacent to Parcel A include sediment sample RC-SD0F-CS03 and surface water sample RC-SW0F-3. Samples collected downgradient of Parcel A included sediment samples RC-SD0F-CS02 and RC-SD0F-CS01 and surface water samples RC-SW0F-2 and RC-SW0F-1.

In sediment samples adjacent to or downgradient of Parcel A, two volatile organics compounds were identified including acetone and methylene chloride. These contaminants were also detected in laboratory

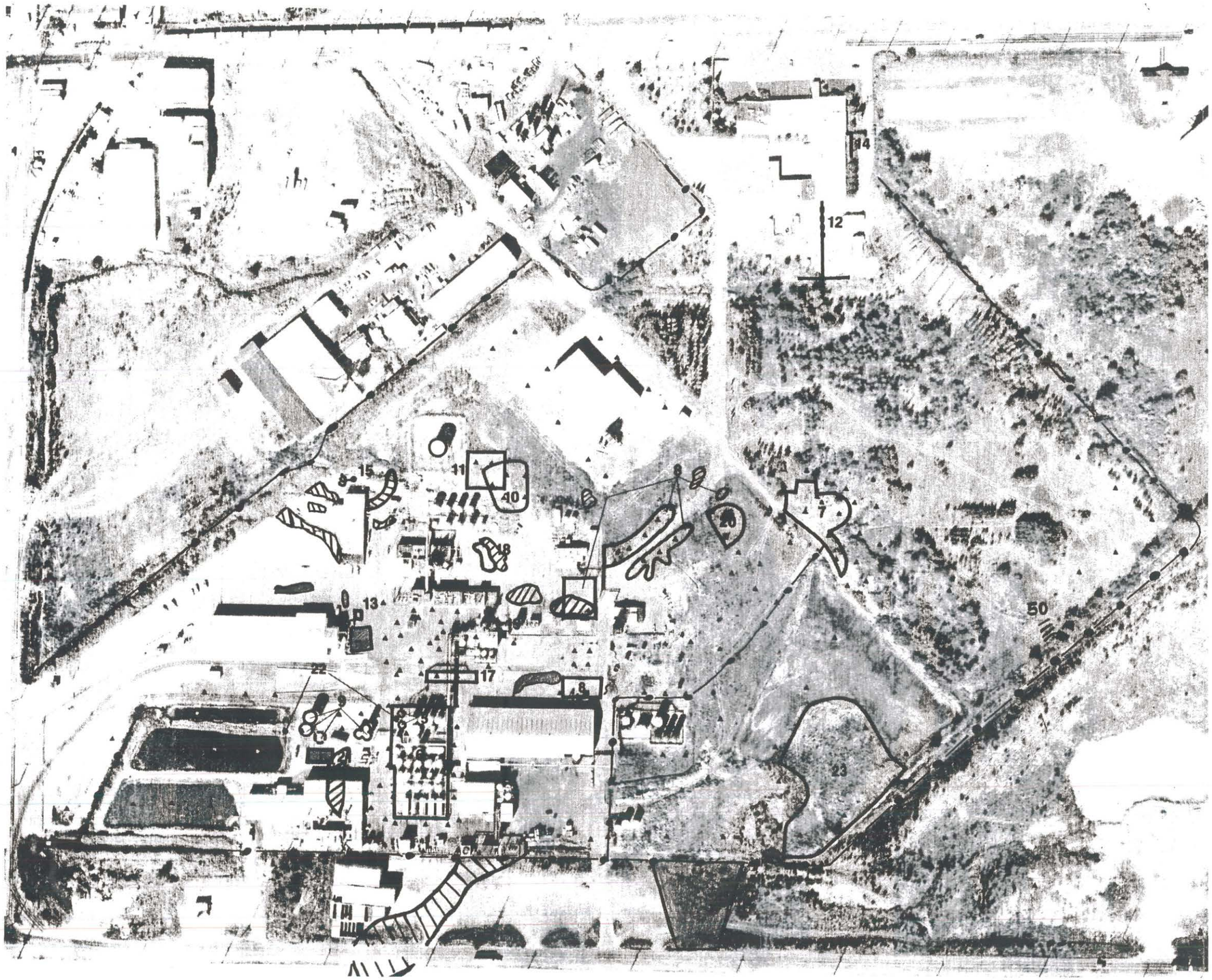
blanks. No semivolatile organic compounds were detected with confirmed concentrations; however, seven polycyclic aromatic hydrocarbons, two phthalate, and benzoic acid were estimated to be present. Estimated concentrations ranged from 0.130 mg/kg for benzoic acid to 1.0 mg/kg for benzo(b)fluoranthene. The estimated concentrations reported were comparable to upgradient concentrations of the same contaminants. Two herbicides, 2,4-dichlorophenoxy acetic acid (2,4-D) and 2,4,5-trichlorophenoxy acetic acid (Silvex) were detected with confirmed concentrations in sediment samples at levels of 0.085 mg/kg and 0.0028 mg/kg respectively. Nineteen inorganic constituents were detected with confirmed concentrations in one or more sediment sample. Of the inorganics detected, only molybdenum and sodium were reported at levels three or more times greater than upgradient sediment samples. The elevated molybdenum and sodium were found in sample RC-SD0F-CS01 collected near the main disposal area, downgradient of Parcel A.

In surface water samples collected from the south drainage way, formaldehyde was the only volatile organic compound detected with confirmed concentrations. The formaldehyde concentrations ranged from 0.057 to 0.098 mg/l, which was comparable to the upgradient formaldehyde range of 0.063 to 0.099 mg/l. No semivolatile organic compounds, pesticides, or polychlorinated biphenyls were detected with confirmed concentrations. Fourteen inorganic constituents were detected with confirmed concentrations in one or more surface water sample. Of the inorganics detected, only copper, potassium, and sodium were reported at three or more times greater than upgradient surface water samples. Elevated copper, potassium, and sodium levels were found in all three surface water samples.

3.0 SOLID WASTE MANAGEMENT UNITS AND AREAS OF CONCERN

This section discusses the description, history, and cleanup activities for each previously identified SWMU and AOC in Parcel A.

Based on the original RFA dated July 15, 1987, two SWMUs and one potential AOC were located in Parcel A: SWMU #12 - Septic Tank and Leach Field, SWMU #14 - Main Office Sanitary Sewer/Drainfield, and AOC #50 - Four Shallow Trenches. Figure 3-1 shows the locations of the two SWMUs and AOC as they were originally designated.



KEY

5	Wood Stave Tanks
6	Resin Tank Farm
7	North Extension[a]
8	Carbon Storage Areas[a]
9	Stormwater Runoff Tanks
10	HCL Pond
11	Catalyst Reclaim Sludge Area
12	Septic Tank and Leach Field
13	Paper Bag Incinerator
14	Main Office Sanitary Sewer/Drainfield
15	Septic System for Office/Control Building of Original PCP Plant
16	Collection Sumps (not shown)
17	Disposal Area south of PCP Plant[a]
18	Disposal Area East of Formaldehyde Process Area[a]
19	Dump Box (exact location unknown)
20	Disposal Area West of North Extension
21	Wastewater Treatment Basins
22	Rock Boxes
23	South Perimeter
50////	Four Shallow Trenches
---	Former Location of Tank 104
▲	Sampling Point
	Drainage Ditches
	Spills
	Drum Areas

[a] Waste deposition boundaries as interpreted from aerial photographs (1959-1985)

N

0 100 200 300

Feet

REICHHOLD CHEMICALS, INC.
TACOMA, WASHINGTON

FIGURE 3-1
PREVIOUSLY IDENTIFIED
SWMUs AND AOCs

Tetra Tech EM, Inc.

Source: original RFA, 1987

Based on a review of the site file, it is believed that the information for SWMUs 12 (Septic Tank and Leach Field) and 14 (Main Office Sanitary Sewer/Drainfield) describe the same unit and that the unit is located at SWMU 12.

Appendix I of the original RFA provides general history of the site. The descriptions for SWMU 12 and SWMU 14 are essentially the same. For instance, both historic descriptions state the units operated until 1974, when the building was connected to the city sewer system and that tanks were pumped clean and backfilled. Further, reports dated after the original RFA only discuss SWMU 12 and make no mention of SWMU 14. Finally, in the original RFA, four 1,000 gallon holding tanks were described as associated with SWMU 14. During remediation of SWMU 12, four septic tanks were unearthed and removed.

Available information regarding unit descriptions, dates of operation, wastes managed, history of releases, and cleanup activities are presented below as well as the units perceived potential to release contaminants in the future.

3.1 SWMU 12 - SEPTIC TANK AND LEACH FIELD

Unit Description. Early drawings for the laboratory in the main office building indicate that the laboratory waste went to four 1,000-gallon holding tanks, and the overflow for these tanks was connected to a tile drain. This septic system was used from approximately 1956 until 1974, at which time the building was connected to the City of Tacoma sanitary sewer system. Contract documents indicate that the holding tanks were to be pumped clean and backfilled in 1974 (CH2M Hill 1989).

Wastes Managed. This unit reportedly received sanitary sewer wastes from the main office and technical service laboratories.

History of Releases. Sampling conducted in 1986 indicated subsurface soil contamination in the vicinity of the leach field and septic tank. Contaminants detected included pentachlorophenol (estimated concentration of 310 micrograms per kilogram [μg/kg]), acetone (17 μg/kg), toluene (190 μg/kg), Aroclor-1248 (36,300 μg/kg), and lead (17,240 μg/kg) (EPA 1987).

In May 1989, soil samples were collected at eight locations within the septic tank area to determine the extent of these contaminants. Samples were collected from a depth of 2.5, 5.0, and 6.5 feet below ground surface. These samples were analyzed for toluene, acid/base/neutral extractable, pesticides/herbicides, and PCBs. All 24 samples contained bis(2-ethylhexyl)phthalate, which was also detected in the laboratory blank. These concentrations ranged from 100 to 920 μg/kg, which is below the 2,000 mg/kg cleanup level identified in the draft RCRA facility investigation guidance document. Polycyclic aromatic hydrocarbons including chrysene, pyrene, and fluoranthrene were reported in five samples at concentrations ranging from 41 to 230 μg/kg, which does not exceed cleanup levels. Pentachlorophenol was detected in one sample at a concentration of 560 μg/kg which is below the cleanup level of 2,000 mg/kg. The PCB Aroclor 1248 was detected in 10 samples, three of which were above cleanup levels. The three samples above cleanup levels were collected at a depth of 2.5 feet below ground surface and contained PCBs between 160,000 and 360,000 μg/kg (CH2M Hill 1989a).

Cleanup Activities. Excavation of contaminated soils took place in 1990. During excavation, the four septic tanks were exposed in the eastern sidewall of the excavation; they were subsequently removed and placed in an engineered waste pile located in the main disposal area onsite. The removal of the tanks required additional soil to be excavated and the number of confirmation samples to be increased. The excavated soils were also placed in an engineered waste pile located in the main disposal area on-site, and covered. Analysis of confirmation samples indicated that a portion of the excavation were above the soil cleanup standards of 10 ppm for PCBs. Additional excavation took place and a second round of confirmation sampling occurred. Evaluation of the second round of confirmation samples indicated that all samples were below the 10 ppm soils cleanup levels for PCBs. The excavation was subsequently backfilled with clean, compacted fill (CH2M Hill 1991).

Release Potential Rating/Media. The current release potential for this unit is low to all media because the source material has been excavated and disposed.

3.2 AOC 50 - FOUR SHALLOW TRENCHES

Unit Description. This potential area of concern was identified from a November 4, 1964 aerial photograph that showed four filled trenches. The area is located along the southern property boundary of Parcel A, within 50 feet of the southern drainage ditch.

Wastes Managed. It was suspected that industrial wastes may have been dumped in the trenches and covered.

History of Releases. In June 1989, eight soil samples were collected at a depth of 2.5 feet to evaluate the nature of contamination at this unit. The 2.5 feet sample depth was estimated to be midway between the aquitard and the soil surface. Samples were analyzed for volatiles, acid/base/neutral extractable, pesticides/herbicides, and PCBs. Bis(2-ethylhexyl)phthalate, acetone, and di-n-butyl phthalate were detected in soil samples as well as laboratory blanks. Other contaminants detected included methylene chloride, carbon disulfide, benzene, toluene, xylene, and ethyl benzene. Sample RC-NP6-2.5-89/5, collected from the northern trench contained the highest concentrations of contaminants. This sample contained 7.0 mg/kg acetone, 3.6 mg/kg methylene chloride, 6.2 mg/kg benzene, 18.0 mg/kg toluene, 59 mg/kg xylene, and 8.3 mg/kg ethyl benzene.

Cleanup Activities. Of the contaminants detected, none exceeded the cleanup levels specified in the May 1989 Interim Final RCRA RFI Guidance Document. Because the levels did not exceed the corrective action cleanup levels, it was concluded that corrective action was not warranted in area 50 (CH2M Hill 1989a).

Release Potential Rating/Media. A release to subsurface soils has been documented at this area, however the levels of contamination are below cleanup levels.

4.0 CONCLUSIONS

The 1987 RCRA facility assessment for the Reichhold Chemicals, Inc. facility identified two solid waste management units (SWMU 12 - Septic Tank and Leach Field and SWMU 14 - Main Office Sanitary Sewer/Drainfield) and one other potential area of concern (AOC 50 - Four Shallow Trenches) located at Parcel A. As mentioned previously, it is believed that SWMUs 12 and 14 actually represent the same unit. Pursuant to Reichhold's permit (permit condition IV.B.[2]), the septic tank and the four shallow trenches were investigated as part of required corrective action/interim measures to be conducted at the facility. Analytical data from the investigations showed PCB concentrations above cleanup standards at the septic tank and below cleanup standards at the four shallow trenches. As such, further work was conducted at the septic tank that included removal of the tanks and associated contaminated soil. Following removal,

confirmation sampling indicated that the residual contaminant levels were below cleanup standards, thus requiring no further action.

During this RFA update, EPA Region 10 files were also reviewed to determine whether other SWMUs or AOCs may be located at Parcel A which were not initially identified on the original RFA. Tetra Tech EM Inc. found no additional information to indicate that additional such units exist at Parcel A.

5.0 REFERENCES

CH2M Hill. 1991. "Corrective Measures Phase I Update - 1990." March.

PRC EMI. 1990. " Operation and Maintenance Inspection (Ground-water Monitoring System) Final Report". Prepared for EPA. February

CH2M Hill. 1989a. "Expanded Soils Investigation and Remediation Report for Areas 49 and 50 and the Septic Tank Area." Prepared for Reichhold Chemicals, Inc. November.

CH2M Hill. 1989b. "Sediment and Surface Water Report: Offsite Drainageways." Prepared for Reichhold Chemicals, Inc., Tacoma Facility. February.

CH2M Hill. 1988a. "Reichhold Revised RCRA Part B Application". Volume 3, Section E, Appendix E-7. January.

CH2M Hill. 1988b. "Nonprocess Area Soil Report". Prepared for Reichhold Chemicals, Inc., Tacoma Facility. June

CH2M Hill. 1988c. "Summary Report, Drilling and Well Installation." November.

CH2M Hill. 1987. "Groundwater Assessment Report." May.

CH2M Hill. 1986. "Site Hydrogeologic Assessment Work Plan." Prepared for Reichhold Chemicals, Inc. Tacoma Facility. August.

EPA 1987, "RCRA Facility Assessment, Reichhold Chemicals, Inc. Tacoma, Washington, WAD 009252891."

USGC 1981. Tacoma North 7.5 Minute Quadrangle Washington. U.S. Geological Survey. 1:24,000-Scale Series.

ATTACHMENT

LEGAL DESCRIPTIONS
PARCELS A, B, AND C

"EXHIBIT A"

Parcel A

All that portion of real property situated in the Northeast Quarter of Section 35, Township 21 North, Range 3 East of the Willamette Meridian, County of Pierce, State of Washington, and being more particularly described as follows:

Beginning at the southeast corner of Lot 1 of Pierce County Short Plat recorded under Auditor's Fee Number 8308190230; thence along the south line of Lot 1 North 88° 18'59" West 456.24 feet; thence leaving said south line North 15° 51'52" East 497.41 feet; thence North 25° 32'58" West 168.64 feet; thence North 33° 46'29" West 167.53 feet; thence North 46° 46'30" West 130.37 feet to a point on the east margin of 49th Avenue Northeast as vacated by Vacation Ordinance Number 17660; thence along said margin North 00° 04'15" West 309.59 feet to the northerly line of Lot 1; thence along said line South 86° 31'40" East 288.34 feet; thence North 00° 34'02" East 200.26 feet; thence North 00° 28'46" East 215.01 feet to the southerly margin of Taylor Way; thence along said margin South 47° 55'54" East 622.22 feet; thence leaving said margin and along the easterly line of Lot 1 South 42° 04'06" West 225.48 feet; thence South 01° 12'53" East 995.88 feet to the Point of Beginning, containing 647,289 square feet or 14.86 acres, more or less.

"EXHIBIT A"

Parcel B

All that portion of Lots 1 and 2 of Pierce County short plat recorded under Auditor's fee number 8308190230, situated in the northeast quarter of Section 35, Township 21 North, Range 3 East of the Willamette Meridian, County of Pierce, State of Washington;
EXCEPT;
Beginning at the southeast corner of Lot 1 of Pierce County Short Plat recorded under Auditor's Fee Number 8308190230; thence along the south line of Lot 1 North 88° 18'59" West 456.24 feet; thence leaving said south line North 15° 51'52" East 497.41 feet; thence North 25° 32'58" West 168.64 feet; thence North 33° 46'29" West 167.53 feet; thence North 46° 46'30" West 130.37 feet to a point on the east margin of 49th Avenue Northeast as vacated by Vacation Ordinance Number 17660; thence along said margin North 00° 04' 15" West 309.59 feet to the northerly line of Lot 1; thence along said line South 86° 31'40" East 288.34 feet; thence North 00° 34'02" East 200.26 feet; thence North 00° 28'46" East 215.01 feet to the southerly margin of Taylor Way; thence along said margin South 47° 55'54" East 622.22 feet; thence leaving said margin and along the easterly line of Lot 1 South 42° 04'06" West 225.48 feet; thence South 01° 12'53" East 995.88 feet to the Point of Beginning, containing 647.289 square feet or 14.86 acres, more or less.
AND EXCEPT;
Commencing at the southeast corner of Lot 1 of Pierce County Short Plat recorded under Auditor's Fee Number 8308190230; thence along the south line of Lot 1 North 88° 18'59" West 580.12 feet to the East Margin of 49th Avenue Northeast, as vacated by vacation ordinance number 17660, to the Point of Beginning; thence continuing along south line North 88° 18'59" West 30.01 feet to an angle point on the south line; thence continuing along the south line North 88° 55'15" West 442.71 feet; thence along the southwest line of said Lot 1 North 45° 53'00" West 441.54 feet; thence North 44° 07'00" East 563.22 feet; thence South 88° 55'15" East 396.73 feet to East Margin of 49th Avenue Northeast now vacated; thence along said East Margin now vacated South 00° 04'15" East 713.46 feet to the Point of Beginning, containing 434,302 square feet or 9.97 acres, more or less.

"EXHIBIT A"

Parcel C

All that portion of real property situated in the Northeast Quarter of Section 35, Township 21 North, range 3 East of the Willamette Meridian, County of Pierce, State of Washington, and being more particularly described as follows:

Commencing at the southeast corner of Lot 1 of Pierce County Short Plat recorded under Auditor's Fee Number 8308190230; thence along the south line of Lot 1 North 88° 18'59" West 580.12 feet to the East Margin of 49th Avenue Northeast as vacated by Vacation Ordinance Number 17660 and the Point of Beginning; thence continuing along south line North 88° 18'59" West 30.01 feet to an angle point on the south line; thence continuing along the south line North 88° 55'15" West 442.71 feet; thence along the southwest line of said Lot 1 North 45° 53'00" West 441.54 feet; thence North 44° 07'00" East 563.22 feet; thence South 88° 55'15" East 396.73 feet to East Margin of 49th Avenue Northeast now vacated; thence along said East Margin now vacated South 00° 04'15" East 713.46 feet to the Point of Beginning, containing 434,302 square feet or 9.97 acres, more or less.